Signatures of Debris Disk Birth Environments

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We predict that certain observational aspects of protoplanetary disks and debris disks should be correlated, because they are each correlated with the disks' birth environments. Disks that form in H II region environments near massive OB stars (such as our own protoplanetary disk) are truncated by photoevaporation down to $\sim$ 30AU radius. Large debris disks (e.g., β Pic, AU Microsopii) cannot have formed in such environments. Large debris disks therefore could not have inherited the short-lived radionuclides ^{26}Al and ^{60}Fe from a nearby supernova as our solar system did. Without the radioactive decay of these isotopes, planetesimals in large debris disks would not have been heated and devolatilized; specifically, they may retain significantly more water than planetesimals in our own solar system. We predict that exozodiacal dust grains replenished by collisions between planetesimals in large debris disks should be different in mineralogy from zodiacal dust in our own solar system. Observable signatures of mineralogical alteration by water on planetesimals may include silicate Fe/Mg ratios and degree of crystallinity.